

THE ROLE OF COMPREHENSION IN THE PRISONER'S DILEMMA

A pilot study on the positive effects of using simplified paradigms

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The prisoner's dilemma is one of the most studied experimental paradigms that is able to model the dynamics of coordination between agents and allow the investigation of these processes of cooperative evolution or involution through the various theoretical and disciplinary perspectives ranging from biology to political science and economics, to mathematics and cognitive and psychosocial science. The contribution of Herbert Simon in this domain was significant, in fact, it is thanks to the construct of "bounded rationality" that it is possible to explain the irrational-constructive tendency of human agents to collaborate in prisoner's dilemmas games that are repeated for a finite number of times. In fact, in games with this structure, Olympic rationality would prescribe one to compete on the last round and then going backwards, to compete on the round immediately preceding that until you come to compete from the start, thus causing a major destruction in both the individual and collective prospective value.

A survey of the vast literature, and our extensive field experience as test administrators of this dilemma for training purposes, made us suspect that although this is a game with two options and only four possible payoffs for each of the parties, the participants are not always able to understand and "digest" the instructions of the game to the point that they have the sufficient cognitive agility available to enable them to focus exclusively on the strategic and motivational assessments of the game.

To overcome this problem, previous research has adopted two basic precautions: engaging participants in "warm-up" sessions, and proposing "decomposed" versions of the game thus simplifying it further. The risk of the first method is that it can affect the motivational processes of participants (such as when one wants to investigate immediate reactions that might otherwise become distorted by the warm-up, or in general when one wants to avoid confounding carryover effects between the trial session and the experimental session itself). The risk of the second method is that the oversimplification does not allow the participant to be able to fully see the different strategic implications of their coordination choices, thus modeling an impoverished dynamic.

We therefore propose a paradigm that, capitalizing on the heuristic value of the bodily metaphor where pulling towards you is automatically associated with acquiring/getting while letting oneself be pulled by the other is automatically associated with giving, reproduces in a dynamic context the classical structure of the prisoner's dilemma.

Essentially, the two participants are side by side and holding hands. The goal of each player is to score as many points as possible by pulling the hand of the counterpart so as to touch his leg. Consistent with the Nash equilibrium, what is typically observed is a stalemate loss / loss situation with the hands of the two participants mutually stuck in the center.

The purpose of this study is to compare the participants' ability to understand and memorize the instructions in this "dynamic prisoner's dilemma" (DPD) in relation to the classical dilemma (CPD) in conditions of both high and low epistemic motivation (EM), namely manipulating the tendency of the participants to develop a deep, accurate and rich understanding of the task.

It is hypothesized that the DPD is more understandable than the CPD irrespective of the level of the EM. Furthermore, we assume that, in contrast to the effects of the "warm up", the improved understanding of the DPD does not deviously influence the propensity of collaboration of the participants of the game.

Materials and methods

Both the CPD and the DPD conditions were illustrated through photographs that explained the basic rules and the scoring system. The only difference in the instructions given was the mode of action: in one instance the action was playing a card, in the other the action was to move an arm.

The EM was manipulated by intervening on the time available for participants to understand the instructions (one minute for the low EM and unlimited time for the high condition).

After reading the instructions, a short questionnaire was administered with 4 multiple choice questions (4 alternatives). Each question concerned a specific payoff: Win-Loss, Loss-Win, Loss-Loss and Win-Win. Lastly, the answer to an open question: "what strategy would you use if you had to play this game for an hour" was then coded on the basis of the propensity to collaborate. The design was thus a 4 (questions, within) x 2 paradigms (DPD vs. DPC) x 2 levels of EM (low-high). There were 120 participants.

Results

The ANOVA revealed the main effect of the paradigm and the EM. The DPD was more understandable than the CPD both in conditions of low EM (85% vs. 39%) as well as high EM (100% vs. 73%). The post hoc analysis revealed that, under conditions of high EM, the questions about Win-Loss and Loss-Win were equally understood in the two paradigms, while the questions about Loss-Loss and Win-Win were less understood in the CPD. With regard to the answers to the open ended question that measured the propensity to play cooperatively, they did not differ according to the paradigm or the EM

Discussion and Conclusions

The results confirm a partial understanding of the CPD, these limitations were not mitigated even by raising the EM. It seems likely that, by not being able to take advantage of an intuitive bodily metaphor, the comprehension and memorization of the structure of the four possible payoff configurations proves cognitively overwhelming. In contrast, the high EM in DPD brings the comprehension up to the maximum (100%), so we can assume that the cognitive energy that participants dedicated to understanding the game could then be freely used to assess how to tackle it.

In addition, we confirmed that in the CPD, the configurations that were more difficult to understand were variable sum (Win-Win and Loss-Loss), leading us to hypothesize that an interpretation of the game as a variable sum game rather than simply a zero sum game was more cognitively taxing.

Lastly, the orientation that tends to be competitive (72%), that emerges from the answers to the open question for both paradigms demonstrates that the improved understanding of the game does not influence either the strategies nor the motivation of the participants, who will then have in the DPD condition more cognitive resources "freed" up from understanding the game to dedicate to the manipulation of the investigators aimed to constructively influence the approach.